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HOP CULTIVATION IN BOHEMIA.

Saaz and Auscha, the two most noted hop-growing districts of Bohemia, are rivals in the production of a hop which is not surpassed by any other in the world, and is equalled in aroma and fine bitter flavor only by the finest "Golding" hop of Kent, England. Each region claims priority as to being the one in which the hop plant was first cultivated, back in almost prehistoric times. The market prices prove the superiority, in the buyer's mind, of the hops grown in Saaz over those of Auscha, although this is attributed to a historical, rather than an actual superiority, by the Auscha growers, who contend that the Auscha hop to-day is as good as the Saaz hop.

CLIMATIC CONDITIONS.

The town of Saaz lies about 50 miles south of Dresden, in a picturesque and historically interesting region on the railway between Prag and Komotau, at an altitude of 600 feet above the sea. Owing to its mild climate, Saaz was noted in former times for its extensive vineyards. The mean winter temperature, according to Braungart, the author of an article¹ from which many points on climate and soil conditions are here taken, is only 28° to 32° F., while in summer it is 64° to 68°. Spring and autumn temperatures vary between 46° and 50°. In 1898, an average crop year, the records of the Saaz Agricultural School, as tabulated by Mr. English, show an absolute minimum temperature in December of only 16° F., and a maximum in August of 88° F. The rainfall in winter amounts to from 1.95 to 3.90 inches; in spring from 3.90 to 5.85; in summer from 5.85 to 7.80; and in autumn from 1.95 to 3.90 inches. The annual total since 1891 has not exceeded 23 inches, and the rainiest months are April and May. According to Braungart, Saaz has the smallest rainfall of Bohemia, and possibly of all middle Europe. Rapid changes of temperature, which are prejudicial to hop culture, are also infrequent in this region.

¹ Braungart, R. Studien ueber die Eigenschaften der Saazer Hopfen und ueber die bei ihrer Gestaltung Wirksamen Ursachen. Reprint from Erste Allgemeine Brauer-Hopfen Revue, No. 2, 1er Jahrgang, Mai, 1894. Published by Franz V. Günzel in Saaz. Out of print, and procurable only by special arrangement with Günzel.

EFFECT OF SOIL ON QUALITY OF PRODUCT.

Although the climatic conditions of Saaz play an important role in the production of a fine hop, the soil conditions are even more important. In fact, the growers and buyers are so convinced of this influence of the soil upon the quality of the product, that they have divided the region about Saaz into three zones, and the hops are graded as first, second, or third quality, according to the zone in which they were grown. The grades are known as: I, *Saaz Stadt* (city); II, *Saaz Bezirk* (district); and III, *Saaz Kreis* (county).

PROTECTING BUYERS.

To regulate the grading and to insure the buyer that the hops he orders are of the quality he desires, coming from the particular zone he has stipulated, a stamping house has been erected by the Hop Growers Society of the city. The aim of this society is to maintain the high reputation of the Saaz hop and insure by an official stamp or seal placed upon every package examined by its officers that the contents were produced in one of the zones above described. There are 480 registered members of this society, each of whom furnishes an accurate account of the number of poles of hops he has grown during the season. With these data at hand it is an easy matter to ascertain if a grower has sold more hops than he has grown, or, in other words, has imported hops from another region and sold them as Saaz hops.

STEAM DRYING ROOMS.

This society has been in existence for 66 years and has lately built a new hall and steam drying house, which is one of the first in the region.¹ The evaporator has a capacity of 1,300 to 1,400 pounds per seven hours, and the charge to growers is \$1.60 for drying 68 bushels of green hops (120 pounds of cured hops). The officer in charge, Mr. Karl Müller, states that with this steam-heating apparatus the hops can be dried at a temperature higher than that which is considered the limit in ordinary drying houses, viz, 89.6° F., the process thus being shortened and a greener color preserved, which is more to the fancy of European buyers, although not necessarily indicative of superior quality.

WHERE THE BEST HOPS ARE GROWN.

The best hops are produced upon a peculiar red clay loam, called the *Rothliegende*, which lies along a small stream, the Goldbach, the waters of which are colored by the soil a warm, yellowish red.

¹ Andrlik and Hueber, of Prag, planned and constructed this drying house or "Darre," as it is called, and plans can be had of them.

The stream overflows its banks every ten years or oftener, doing considerable damage, but leaving a deposit of rich sediment on the overflowed fields. Two-thirds of the Saaz hops are grown along this stream. This soil along the Goldbach is a fine, deep, rich clay, with great water-holding capacity, poor in magnesium salts, lime, and chlorides, and containing considerable quantities of iron oxide. Geologically, it is formed by the disintegration of the so-called "*Rothliegenden*," or lower Permian formation, and is made up of broken-down red sandstone, which is composed of quartz, mica, and feldspar fragments. This soil is universally admitted to be the most important factor in the production of the characteristic Saaz hop.

The distinguishing features of the Saaz hop are very compact closed scales, a silky texture, abundance of fats and resins; a large amount of "lupulin," a high polish, and, when properly dried, a bright greenish-yellow color. Hops grown on this red soil do not break to pieces so readily as those grown elsewhere, and therefore the lupulin does not fall out so easily during packing and shipping.

The value of hop soils about Saaz varies considerably, the best being valued at more than a thousand dollars per hectare (2.47 acres). The range is from \$240 to \$560 an acre. The most valuable locations are valleys and hillsides sheltered from the prevailing winds, which latter whip the plants and injure them seriously.

METHODS OF TRAINING THE VINES.

Two distinct systems of culture are in practice in Bohemia. The plants are trained to poles, or upon wires. In both cases the plants are grown in rows, 40 inches apart each way. In the old or pole system a pine pole 20 feet high is set in the ground beside each plant, and two vines are trained upon it, being held in position by straw wisps or bits of twine, which are renewed during the season as they rot or are torn away. The newer method, or wire system, while costing more to inaugurate, is less expensive to maintain, gives more room for cultivation between the rows, and allows a freer circulation of air through the garden. Hop diseases are reputed to be less prevalent in such gardens. An overhead system of wires, running lengthwise of the rows, is supported by firmly planted posts about the size of telegraph poles. These latter are properly guyed by strong wires, and those at the border of the field are tilted outward, at an angle of 20 degrees from the perpendicular, to resist the strain brought upon them by the long, tightly strung wire. Numerous cross wires, tightened by twists, keep this overhead network taut, at a distance of 20 feet from the ground. Strong hemp twine supports are suspended from these overhead wires by means of simple hooks of bent wire, or are tied to the wires by an ingenious

machine fastened to the end of a pole. In the former case one end of a twine is first attached to a hook, and the latter is then caught on the end of a long pole and hooked over the wire at the desired place, immediately above the plant for which the twine is to serve as support. The lower end of the twine is fastened to a short stake driven into the ground by the side of the plant. No binders are required to fasten the plant to these twine supports. The cost, during the summer, of caring for a garden on the wire system is considered 20 per cent less than that of caring for one with poles.

WHEN AND HOW CUTTINGS ARE PLANTED.

The cuttings are planted in April at the bottom of holes dug with a mattock, being placed in pairs close together with their upper ends 7 inches below the surface of the soil. As the cuttings grow the holes are gradually filled up with earth until level with the ground. Although old hop plants admittedly produce a superior quality of hop, they bear scantily, and it has been found that seven years is the limit of profitable cultivation, both from the standpoint of the plants and in order to allow a suitable rotation with lucern (alfalfa), the favorite green manure. Great stress is laid upon the pruning in the spring, care being taken that the last year's stems are cut back to the old stock, and only two or three new shoots allowed to grow.¹

The hop gardens are models of clean culture, scarcely a weed being seen anywhere, and every square inch of soil is utilized. Farm-yard manure is the only fertilizer used to any extent, although potash and phosphoric acid fertilizers are being introduced.

ONLY FEMALE PLANTS CULTIVATED.

As the hop of commerce is the seedless flower cluster of the female plant, quite naturally only plants of this sex are cultivated in the gardens, although male plants are sometimes seen in cultivated fields. The greatest pains are taken to immediately root out any of the chance male plants which have come up from seed or have otherwise gotten into the garden. In Auscha there are old laws which enforce their immediate removal. Such male plants are called wild hops and are most abundant in waste places about the gardens. A single male plant in a garden will fertilize enough females to materially injure the whole harvest by the formation of a high percentage of seed in the otherwise seedless flowers. When the number of hops with seeds reaches more than two-tenths of one per cent they are rated in Bohemia as of second grade quality. I was told in Saaz

¹ It is worth remarking that a very palatable salad called hop salad is made in Saaz from the very young blanched shoots of the hop before they are more than an eighth of an inch in diameter. The shoots are pulled off the stock, boiled in water, and served with a French dressing of salt, pepper, and vinegar.

that English and American hops contain quantities of seed even as high as 6 and 7 per cent. The effect of the seeds in the brewing process is not known to me; the idea, however, as expressed by Bohemian hop growers, is that they give a peculiar flavor to the beer, which is more objectionable to the Continental beer drinkers than to the English.

THE AUSCHA RED HOPS.

In Saaz there are very few varieties of hops cultivated, the Auscha Red hop being almost universally grown. The preference is given to this variety because of its great productiveness, although it is exceeded by the old Saaz variety in fineness of aroma and bitter flavor.

It is an interesting fact that every year thousands of cuttings of this Auscha Red hop are imported into Saaz. Two-thirds of the hops cultivated are from these imported cuttings, and the yield from them as compared with that from home-grown cuttings is as 13 to 7, and sometimes quite double. The average production from this variety is 110 pounds per 420 plants, but sometimes 240 plants produce a centner (110 pounds). The claim is made that the first and second years after their introduction into Saaz, the plants grown from Auscha cuttings do not produce a hop that is equal to that from the old Saaz plants, but that, gradually, they become ameliorated by growth in the wonderful Saaz soil, and later yield a product quite up to the standard. The bearing capacity gradually decreases, however, and it is considered necessary with every new planting to import afresh the Auscha cuttings.

This Auscha Red hop above referred to is known among Auscha hop growers as the "*Semsch*" hop, having been found in a garden near Auscha by a peasant of that name. In recognition of the value of his discovery the hop growers of Auscha, rather tardily, it must be said, presented his son, now an old man, with a medal or diploma. No systematic attempts to breed new varieties of hops seem to have been made in these regions, notwithstanding this interesting discovery.

This Semsch hop is superior to American varieties as known in Bohemia. The attempts which have been made to induce the Bohemian brewers to utilize our much cheaper American hops, have utterly failed. The brewers declare that American hops are worthless for brewing such beers as they have a market for. One of the best firms in Auscha informed me that in rating American hops they would class them on a par with Belgian hops, which are noted as the worst of all European varieties. On the American market small quantities of the Semsch hop were sold by this same firm last year, and brought 58 cents per pound, while American hops were selling for 19½ cents.

This Semsch variety is worthy a thorough trial in American gardens, and if a region can be found with soil and climatic conditions similar to those of Saaz, the Semsch cuttings might produce a grade of hops rivaling the latter in excellence. The benefits from imported cuttings in Saaz furnish a striking example of the value of plant introduction, and of the rejuvenation of a plant culture by growing cuttings from another region. This principle of introducing from a colder to a warmer region is well recognized in America, in the case of seeds, but its application to cuttings has certainly not received the study it deserves. Neither has the relation of soil and climatic conditions to the growth of cuttings been determined.

IMPORTATION OF HOP CUTTINGS.

Arrangements have been made for the importation of a considerable number of cuttings of the Semsch hop for the purpose of testing them under the various soil and climatic conditions prevailing in the American hop-growing districts. It would be a happy outcome if they proved as successful as they have in Saaz. In order to ascertain whether the Auscha Red hop when transferred to America will retain its native productiveness, and also to determine if the acquired characters, gained by cultivating the same variety for years in Saaz, will be retained, a quantity of cuttings from both places has been ordered for the spring of 1900. In addition, three other varieties are imported for trial, namely, the Auscha Green hop, Auscha Late hop, both good second grade varieties, and the true Saaz hop, from plants cultivated for a great many generations in Saaz.

According to Professor E. Gross, of the Agricultural College at Tetschen, Bohemia, the last-named sort, the Saaz Red or Gold hop, is the best very early variety, but it is said to be delicate and to yield only moderately. The lupulin content is high (15 per cent or over), and consequently these hops command a high price.

The Semsch or Auscha Red hop is ready for picking about ten days later than the Saaz, is more vigorous, and yields more. The lupulin content, however, is much less, being only 9.13 per cent according to Haberlandt.

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Approved:

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